

## Precalc Warm Up # 9-4

Factor completely:

1.  $x^3 - 9x$

2.  $2x^3 + 5x^2 - 8x - 20$

Multiply:

3.  $(a+b)^2$

4.  $(a+b)(a^2 - ab + b^2)$

5. Use #4's pattern to factor:  
 $8x^3 + 125$ 

## HW Questions:

In Exercises 1–8, sketch the graph of the function.

1.  $f(x) = (x + \frac{3}{2})^2 + 1$

5.  $f(t) = t^3 - 3t$

In Exercises 9–16, find the maximum or minimum value of the quadratic function.

9.  $g(x) = x^2 - 2x$

13.  $f(t) = -2t^2 + 4t + 1$

In Exercises 17–22, perform the indicated division.

17.  $\frac{24x^2 - x - 8}{3x - 2}$

$$\begin{array}{r} 8x + 5 \\ 3x - 2 \overline{) 24x^2 - x - 8} \\ \underline{-(24x^2 - 16x)} \phantom{- 8} \\ 15x - 8 \\ \underline{-(15x - 10)} \\ 2 \end{array}$$

$$8x + 5 + \frac{2}{3x - 2}$$

21.  $\frac{x^4 - 3x^2 + 2}{x^2 - 1}$

$$\frac{(x^2 - 2)(\cancel{x^2 - 1})}{\cancel{x^2 - 1}} = x^2 - 2$$

In Exercises 23–26, use synthetic division

25.  $\frac{6x^4 - 4x^3 - 27x^2 + 18x}{x - (2/3)}$

Use synthetic division to see if the given values of  $x$  are zeros.

29.  $f(x) = 2x^3 + 7x^2 - 18x - 30$

(a)  $x = 1$

(b)  $x = \frac{5}{2}$

(c)  $x = -3 + \sqrt{3}$

(d)  $x = 0$

$$\begin{array}{r|rrrrr} -3 + \sqrt{3} & 2 & 7 & -18 & -30 & \\ & & -6 + 2\sqrt{3} & 3 - 5\sqrt{3} & 30 & \\ \hline & 2 & 1 + 2\sqrt{3} & -15 - 5\sqrt{3} & 0 & \end{array}$$

yes,  $-3 + \sqrt{3}$  is a zero

$$(-3 + \sqrt{3})(1 + 2\sqrt{3})$$

$$\begin{aligned} & -3 - 6\sqrt{3} + \sqrt{3} + 2(3) \\ & 3 - 5\sqrt{3} \end{aligned}$$

$$(-3 + \sqrt{3})(15 - 5\sqrt{3})$$

$$\begin{aligned} & 45 + 15\sqrt{3} - 15\sqrt{3} - 5(3) \\ & 45 - 15 \\ & 30 \end{aligned}$$

$$33. \left( \frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{2}i \right) - \left( \frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}i \right)$$

$$-\frac{\sqrt{2}}{2}i - \frac{\sqrt{2}}{2}i$$

$$-\frac{2\sqrt{2}i}{2}$$

$$-\sqrt{2}i$$

$$37. (10 - 8i)(2 - 3i)$$

$$41. \frac{4}{-3i} \cdot \frac{i}{i}$$

$$\frac{4i}{3}$$

In Exercises 43–46, use synthetic division to find the specified value of the function.

$$45. f(x) = x^4 + 10x^3 - 24x^2 + 20x + 44$$

$$(a) f(-3)$$

$$(b) f(\sqrt{2}i)$$

$$f(k) = r$$

$$1 \quad 10 \quad -24 \quad 20 \quad 44$$

$$\sqrt{2}i \quad -2+10\sqrt{2}i$$

$$1 \quad 10+\sqrt{2}i$$

In Exercises 47 and 48, find a fourth-degree polynomial with the given zeros.

$$47. -1, -1, \frac{1}{3}, -\frac{1}{2}$$

$$\sqrt{2}i(10+\sqrt{2}i)$$

$$10\sqrt{2}i + 2(i^2)$$

$$f(x) = (x+1)^2 \left(x - \frac{1}{3}\right) \left(x + \frac{1}{2}\right)$$

ok to leave it like this "  
(They didn't ask for standard form.)

In Exercises 49–54, find all zeros of the function.

49.  $f(x) = 4x^3 - 11x^2 + 10x - 3$

53.  $f(x) = 6x^4 - 25x^3 + 14x^2 + 27x - 18$

3, or 1 pos.

$f(-x)$

1 neg.

$$\begin{array}{r|rrrrrr} 3 & 6 & -25 & 14 & 27 & -18 \\ & & 18 & -21 & -21 & 18 \\ \hline -1 & 6 & -7 & -7 & 6 & 0 \\ & & -6 & 13 & -6 & \\ \hline & 6 & -13 & 6 & 0 & \end{array}$$

solve

$$(x-3)(x+1)(6x^2-13x+6)$$

In Exercises 55–64, analyze the equation and sketch its graph.

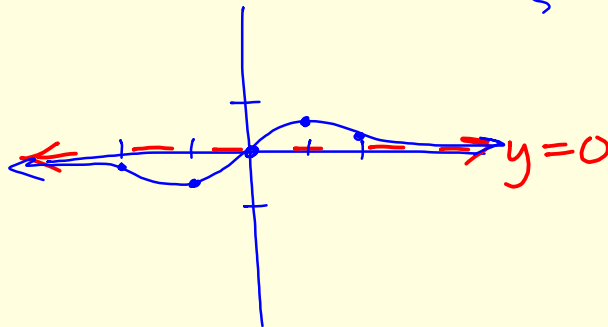
57.  $y = \frac{x}{x^2 + 1}$

horiz:  $y = 0$

$(0, 0)$

61.  $y = \frac{x}{x^2 - 1}$

x	y
1	1/2
-1	-1/2
2	2/5
-2	-2/5



In Exercises 65–72, write the partial fraction decomposition for the rational expression.

65.  $\frac{4-x}{x^2+6x+8}$

69.  $\frac{x^2+2x}{x^3-x^2+x-1}$

$$\frac{x^2(x-1)+1(x-1)}{(x-1)(x^2+1)}$$

$$= \frac{A}{x-1} + \frac{Bx+C}{x^2+1}$$

$$x^2+2x = A(x^2+1) + (Bx+C)(x-1)$$

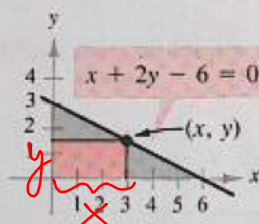
$$x=1 \rightarrow 1+2 = A(2)$$

$$\frac{3}{2} = A$$

$$x=0 \quad 0 = \frac{3}{2} + (-C)$$

$$x =$$

77. A rectangle is bounded by the  $x$ - and  $y$ -axes and the graph of  $x + 2y - 6 = 0$  (see figure). What length and width should the rectangle have so that its area is maximum?



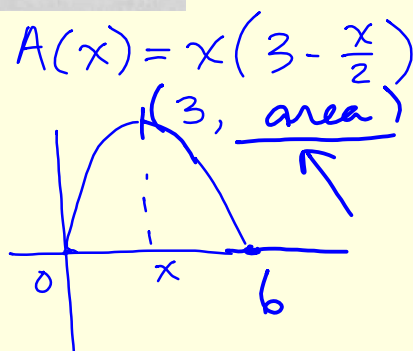
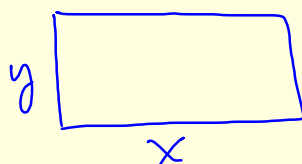
$$x + 2y - 6 = 0 \rightarrow 2y = 6 - x$$

$$y = 3 - \frac{x}{2}$$

$$3 - \frac{x}{2} = 0$$

$$3 = \frac{x}{2}$$

$$x = 6$$



Test PC Chapter 3 on Friday:

*also factoring*

Quadratic Functions

Higher Degree Polynomials

Polynomial Long and Synthetic  
Division

Real Zeros

Complex Numbers

Complex Zeros and factoring  
completely

~~Graphing Rational Functions~~

Group Event

~~Partial Fraction Decomposition~~

Will be Group  
Event next week

Group Event:

No Graphers.

Graphing Rational Functions  
without a graphing calculator.  
Will count as a quiz.

HW: PC book

p. 246 (at the bottom of the page)

# 27, 51

and also do p. 219 #43

and revisit

p. 180 # 31-34 and 47 from 3.1